

Applicant(s) : Hacker et al.  
Serial No. : 09/371,796  
For : Herbicidal Compositions for Tolerant or Resistant Cotton Crops  
Filed : 10 August 1999  
Examiner : Pryor, Alton Nathaniel  
Art Unit : 1616

DECLARATION

I, Dr. Erwin Hacker, declare and say that:

I am a resident of 65239 Hochheim in the Federal Republic of Germany; I am a citizen of the Federal Republic of Germany. From 1975-1980 I studied agricultural science at the University of Stuttgart/Hohenheim. From 1980-1983. In 1984 I received my Ph.D. degree in weed science from that university. Since 1983 I have been employee in facilities of Hoechst AG, Hoechst Schering AgrEvo GmbH, Aventis CropScience GmbH, Bayer CropScience GmbH and Bayer CropScience AG, and have worked in their departments for Biological Research, Field Research or Agronomic Development of agrochemicals, especially of herbicides and safeners. Presently, I am in charge of Early Development Herbicides in the Agronomic Development Department of Bayer CropScience AG, Monheim, Germany, which is the present assignee of U.S. Patent Serial No. 09/371,796. I have been involved in herbicide research since 1983.

I am familiar with U.S. Patent Serial No. 09/371,796 filed August 10, 1999 for HERBICIDAL COMPOSITIONS FOR TOLERANT OR RESISTANT COTTON CROPS, and consider myself qualified to speak to the subject matter of that patent based on my knowledge of herbicide screening and evaluation and my 25 years experience in evaluating biological effects of agrochemicals.

Under my supervision tests related to the subject matter of U.S. Patent Serial No. 09/371,796 were conducted and evaluated. The results are reported below.

### Test conditions

In field trials herbicides (A) and (B) (defined below), separately and combinations thereof, were tested for the purpose of evaluating their herbicidal effect against specific problem weeds and their crop safety in (or damage to) cotton crops. In these trials herbicide (A) was glufosinate-ammonium salt while compound (B) was selected from various compounds (B) (as commercially available formulations), which are below identified in the tables.

The specific weed plants were grown in the open on 2m x 5m plots under natural field conditions. In parallel tests seeds of cotton plants with a transgenic tolerance to the herbicide (A) applied were grown on 2m x 5m plots under natural field conditions. The treatment with the herbicidal active ingredient or with the active ingredient combination, respectively, was carried out under standard conditions with a plot sprayer at a spray volume of 200-300 liters of water per hectare. The test plants were treated at the leaf-stage indicated in the tables below. After the period indicated in the tables below, the effects of the treatments on the test plants (weed and cotton plants) were visually scored in comparison with untreated control plants. The results in the tables represent the average of the scorings of the plants per plot and treatment.

Scoring: The damage to, and the development of, all aerial parts of the plants was recorded. Scoring was done on the basis of a percentage damage in accordance with a range of 0% to 100% in steps of 1 percent in assessments. Examples of scoring: 100% action = all plants destroyed; 50% action = 50% of the plants or green parts of the plants (biomass) destroyed or reduced; 0% action = no recognizable effect = like control plot. Average numbers are rounded off in case of 1 to 4 tenth percent values or rounded up in case of 5 to 9 tenth percent values.

As a criteria for the result of a combination, the **Additive Evaluation Method** was applied, i. e. the observed effect "E" of a combination (A)+(B) is regarded as being synergistic if it

exceeds the total sum  $E^A$  of the herbicidal effects obtained upon separate applications of the single active ingredients (A) and (B).

In cases where the effect  $E^A$  (total sum of the herbicidal effect of the individual applications) according to the Additive Evaluation Method is formally above 100% herbicidal effect the criteria of the Additive Evaluation Method can not be applied for estimation. In these cases and alternatively in all cases, the criteria according to the Colby method may be used in evaluating the herbicidal effect of combined herbicidally active ingredients. If an observed effect "E" of a combination A+B is above the herbicidal effect  $E^C$  according to Colby, then the effect is considered to be "synergistic".

The value  $E^C$  according to Colby is calculated using the following formula (cf. S. R. Colby, in Weeds 15 (1967) pp. 20 to 22):

$$E = A+B-(A \cdot B/100)$$

The figures in the formula denote:

- A, B = activity of the active compound (A) or (B) in % at "a" grammes a.i./ha (A) or "b" grammes a.i./ha (B), respectively;
- $E^C$  = combined activity for compounds (A) + (B) estimated according to Colby in % for combined treatment with "a" g a.i./ha (A) + "b" g a.i./ha (B)

### Test results

Abbreviations generally used in the Tables:

- g a.i./ha = gram of active ingredient (100% active substance) per hectare
- DIGSA = *Digitaria sanguinalis*
- GOSHI, glu-tol = *Gossypium hirsutum* (glu-tol), glufosinate-tolerant cotton
- $E^A$  = effect according to the Additive Evaluation Method  
(=Total sum of the herbicidal effects of the individual applications)
- $E^C$  = combined effect according to Colby

**Tests with Glufosinate-ammonium (GA)****GA + Trifluralin - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Trifluralin	421	11 %	0 %
(A) + (B)	225 + 421	35 % $E^A = 31 \%$	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment**GA + Norflurazon - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Norflurazon	280	22 %	4 %
(A) + (B)	225 + 280	45 % $E^C = 38 \%$	10 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment**GA + Clomazone - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Clomazone	150	4 %	4 %
(A) + (B)	225 + 150	33 % $E^A = 24 \%$	12 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment

**GA + Bispyribac-sodium salt - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Bispyribac-Na	25	11 %	0 %
(A) + (B)	225 + 25	32 % $E^C = 29 \%$	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment**GA + Quizalofop-P-ethyl - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Quizalofop-P-ethyl	20	8 %	0 %
(A) + (B)	225 + 20	33 % $E^A = 28 \%$	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment**GA + Fluazifop-P-butyl - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Fluazifop-P-butyl	20	5 %	0 %
(A) + (B)	225 + 20	37 % $E^A = 25 \%$	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment

**GA + Propaquizafop - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Propaquizafop	30	9 %	0 %
(A) + (B)	225 + 30	38 % E <sup>A</sup> = 29 %	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment**GA + Fenoxaprop-P-ethyl - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Fenoxaprop-P-ethyl	20	18 %	0 %
(A) + (B)	225 + 20	37 % E <sup>c</sup> = 34 %	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment**GA + Sethoxydim - Herbicidal effect in field trial**

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Sethoxydim	60	10 %	0 %
(A) + (B)	225 + 60	37 % E <sup>A</sup> = 30 %	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatment

GA + Cycloxydim - Herbicidal effect in field trial

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Cycloxydim	50	18 %	0 %
(A) + (B)	225 + 50	52 % $E^A = 38 \%$	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatmentGA + Clethodim - Herbicidal effect in field trial

Active substance(s)	Dose <sup>1)</sup> g a.i./ha	Herbicidal action (%) <sup>2)</sup> on DIGSA	Damage <sup>2)</sup> on GOSHI, glu-tol
(A) Glufosinate-ammonium	225	20 %	0 %
(B) Clethodim	30	20 %	0 %
(A) + (B)	225 + 30	42 % $E^A = 40 \%$	0 %

<sup>1)</sup> Application in the 1-3-leaves stage<sup>2)</sup> Evaluation 15 days after treatmentConclusion

It is evident from the results that the tested herbicidal combinations show a synergistic increase in herbicidal effect against a problem weed at a level where the safety in the glufosinate-tolerant cotton plants is excellent or sufficient. The herbicidal combinations according to the method of U.S. Patent Serial No. 09/371,796 are thus valuable combinations for controlling the problem weed in glufosinate-tolerant cotton. The valuable effects have not been known before and are surprising.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further, that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 18th February, 2011

By: Erwin Hacker  
Erwin Hacker